

action of surrounding waters long enough for a deposit of calcite to be formed within the marginal vesicles before the infiltration of silica occurred.

Of the section of chert labelled C 41 I could make but little; it appeared to contain elastic granules of quartz.

XIV.—*Recent Dredging by the United-States Fish Commission off the South Coast of New England, with some Notice of the Crustacea obtained.* By S. I. SMITH.

THE United-States Commission of Fish and Fisheries, under the direction of the Commissioner, Professor Baird, with headquarters at Newport, Rhode Island, has had increased facilities for scientific work the past season, and has added even more than in past years to the knowledge of our marine fauna. The new steamer 'Fish Hawk,' of 480 tons, built for the work of the Commission, and under the command of Lieut. Tanner, U.S.N., is specially fitted for scientific work, and was employed a large part of the season in trawling, dredging, and in making temperature observations. The investigation of the invertebrate fauna, as in previous years, was carried on by a party under the general direction of Professor Verrill, of Yale College. Large collections were made in the shallower waters along the coast and also on the shores; but the most interesting results were obtained from a series of trawlings and dredgings made in September and the first week in October, on three trips 75 to 100 miles off the coast, in the region known as the Block Island Soundings. A general account of these trips is given by Prof. Verrill in the 'American Journal of Science' for November (vol. xx. pp. 390-403), and need not be repeated here, further than that the region examined is in north lat. $39^{\circ} 46'$ to $40^{\circ} 06'$, west long. $70^{\circ} 22'$ to $71^{\circ} 10'$, that on each trip the dredging and trawling occupied less than a day's time, and that twenty-two hauls of the dredge and trawl were made from depths varying from 64 to about 500 fathoms. Wire rope was very advantageously employed in all the dredging and trawling. At one station, 86 fathoms, the bottom was covered with shells and sponges; but at all the other stations it was composed of fine sand and mud.

The collections have not been fully examined; and this is specially true of the collections from the deepest water which were made on the last trip. But the wonderful richness of the fauna in mollusks and echinoderms has been shown by Professor Verrill in the paper already referred to; and it is

certainly not less remarkable as regards the crustaceans. The richness of the fauna in both species and individuals would never have been suspected by one accustomed only to the meagre fauna of the shallow waters of the south coast of New England.

In regard to the mollusks and echinoderms, it is here sufficient to quote a few sentences from Professor Verrill's article. He says:—"Of Mollusca about 175 species were taken. Of these, 120 species were not before known to occur on the southern coast of New England; about 65 are additions to the American fauna; of these about 30 are apparently undescribed. The known species now added to our fauna have mostly been described by G. O. Sars, Jeffreys, and others from the deep waters of the European coast and the Mediterranean." "The Starfishes and Ophiurans were exceedingly abundant and beautiful at all the stations; and many species not known previously on our coast were taken, several of which appear to be undescribed, while others were known only from Northern Europe or from the deep waters off Florida. Many of the species have only recently been obtained from the northern fishing-banks off Nova Scotia. One new species of *Archaster* (*A. americanus*) was particularly abundant, several thousands of specimens having been taken; but the two largest and most beautiful species of this genus were *Archaster Agassizi* (new) and *A. Floræ*. Of *Odontaster hispidus* over 100 were taken." There are thirty-two species in the partial list of echinoderms given, four of which are described as new.

A preliminary notice of the Crustacea obtained from this interesting region is now in type for the 'Proceedings of the National Museum' for 1880 (pp. 413-452); and I here give only a very brief statement of the most interesting results there brought out, with full descriptions of the new forms.

Among the Brachyura were *Hyas coarctata*, *Cancer borealis*, and *Geryon quinquedens*, which were known from further north; but with these there were *Collodes depressus*, *Euprognatha rastellifera*, *Bathynectes longispina*, and *Acanthocarpus Alexandri*, species previously known only from the Straits of Florida. There were also new species of *Ethusa* and *Lambrus*, genera quite new to our waters. The *Euprognatha* occurred in the greatest abundance at nearly every station, many thousands of specimens often being taken at a single haul.

Among the Anomura occurred *Homola barbata* and *Latreilia elegans* (which represent families heretofore unknown on this side of the Atlantic), a beautiful species of *Lyreidus*, De

Haan (a genus before known only from the North Pacific), and a species of *Munida*. These were associated with *Eupagurus bernhardus*, *E. Kröyeri*, and the remarkable *Parapagurus pilosimanus*, which were before known from the north. But the most interesting Anomura were two species of a new genus (*Hemipagurus*), allied to the little-known genus *Spiropagurus*, Stimpson, but differing conspicuously in the form and position of the single sexual appendage of the last thoracic somite of the male, which arises from the coxa of the *right* side, while in *Spiropagurus* it arises from the *left* side. Both the species of *Hemipagurus* inhabit cases formed by a colony of *Epizoanthus* or by an individual of a species of *Adamsia*.

The unsymmetrical development of the external sexual organs of the males of this genus is accompanied by a most remarkable difference in the corresponding internal organs. The abdominal viscera are not sufficiently well preserved in the ordinary alcoholic specimens for a full anatomical and histological investigation; but the following observations, though incomplete, are so novel and interesting that I insert them here. The right testis and vas deferens are much larger than the left. The lower part of the right vas deferens, in all the adults examined, is much more dilated than the left, and is filled (as is also the external part of the duct) with very large spermatophores of peculiar form. The left vas deferens is slender, much as in *Eupagurus bernhardus*, terminates in a small opening in the left coxa of the last thoracic somite, as in ordinary Paguroids, and contains spermatophores somewhat similar in form and size to those of *Eupagurus bernhardus*. In alcoholic specimens of the larger and more abundant of the two species, the spermatophores from the left vas deferens are approximately 0.16 millim. long and 0.035 millim. broad, with a slender neck about a third of the entire length, and a very thin and delicate lamella for a base. The spermatophores from the right vas deferens are over 2 millims. in total length; the body itself is oval, approximately 0.40 millim. long and a third as broad; at one end it terminates in a very long and slender process, two or three times as long as the body; at the other end there is a similar but slightly stouter process, a little longer than the body, and expanding at its tip into a broad and very delicate lamella, approximately 0.35 millim. long by 0.20 millim. broad. The contents of the two kinds of spermatophores are, of course, not in a condition to show the structure of the spermatozoa; but they present a similar appearance in each case, and are apparently of about the same size.

The most interesting of the Macrura is, perhaps, a new

species of *Nephropsis*, very closely allied to *N. Stewarti*, Wood-Mason, heretofore the only known species, which was described from a single specimen dredged in the Bay of Bengal and wanting the great claws. These claws, in our specimens, are clothed with very long soft hair, and are very different from the great claws of *Nephrops*, though the genus is very closely allied to *Nephrops*, as pointed out by Wood-Mason. The number and arrangement of the branchiæ, not noticed in the description of *N. Stewarti*, are the same as in *Nephrops*. There were also new species of *Arctus*, *Axius*, *Pontophilus*, *Bythocaris*, *Pandalus*, and *Pencæus*, and with these the following arctic species—*Pontophilus norvegicus*, *Pandalus propinquus*, *Hippolyte securifrons*, and *Sergestes arcticus*, the last species being common in 300 to 500 fathoms.

Among the Schizopoda were three arctic species, *Thysanopoda norvegica*, *Pseudomma roseum*, and *Boreomysis arctica*, the last heretofore known to America only from Greenland.

The only Stomatopod was a new species of *Lysiosquilla*, which appears to be closely allied to *L. spinosa*, from the Indian Ocean and New Zealand, or at least much more closely allied to this than to any other species described in Mr. Miers's recent review of the Squillidæ.

Few species of Amphipoda were found; but the arctic species, *Stegocephalus ampulla*, *Haploops setosa*, and *Epimeria loricata*, G. O. Sars, occurred, the last in abundance.

Among the Isopoda there were four species previously known only from further north on our coast, and *Mounopsis typica*, a deep-water species known from our northern coast, Greenland, and Northern Europe. There were besides several species not determined.

Fifty species of Malacostraca are enumerated in the preliminary notice above referred to; and of these fourteen are described as new and three others are indicated as probably new, forty-three are first recorded as belonging to the New-England fauna south of Cape Cod, twenty-eight are new to the whole fauna from Cape Hatteras to Northern Labrador, and twenty-one are new to America including Greenland. Of the forty-three species new to the Southern New-England fauna, fifteen are now known also from the New-England fauna north of Cape Cod; and of the remaining twenty-eight, four were already known from the Straits of Florida, three from Greenland and Northern Europe, and two from the Mediterranean. It should be added that two of the species, the *Lyreidus* and the *Nephropsis*, belong to genera heretofore known only from the Pacific region, and each represented there by a single species, while a third species, the *Lysiosquilla*, has its nearest known ally in a species from the same region.